

Sectoral implementation of nationally determined contributions (NDCs)

May 2017

TRANSPORT

This publication forms part of a series of NDC sectoral overviews, which provide information about current sectoral contributions to global greenhouse gas emissions and prospects for implementing NDCs in these sectors.

Each briefing paper presents concrete options for integrating sectoral measures in future NDCs, as well as more general cross-sectoral recommendations for moving forward with emissions-reductions measures.

Written primarily from the perspective of climate change experts, with input and suggestions from sector colleagues, the briefing series' intended target audience is twofold: first sectoral experts, who are facing the challenge of implementing the NDCs and related climate policies in their respective sectors; and second climate change experts, highlighting the relevance of the sector for NDC implementation.

This briefing paper presents the situation and prospects for implementation of NDCs in the transport sector. During the course of 2017, further enhanced recommendations for the transport sector will be published in a synthesis paper based on an in-depth analysis of empirical case studies conducted by the GIZ project Advancing Climate Strategies in Rapidly Motorising Countries.
www.giz.de/en/worldwide/40579.html

Transport and climate change

Implications of the Paris Agreement targets for the transport sector

The transport sector accounted for approximately 14.3% of global GHG emissions in 2010 (Sims et al. 2014). Approximately 15% of transport emissions in 2014 came from bunker fuels used for international aviation and maritime transport (IEA 2016c). Most of the remaining transport-related emissions are attributed to domestic fuel-usage and could, therefore, be addressed through domestic actions and contributions, as communicated through NDCs. Figure 1 shows how transport emissions under current policies from non-OECD countries will far outgrow those of OECD countries up to 2030 (IEA 2016c). Emissions increases in non-OECD countries are driven by economic growth and the associated increase in vehicle ownership and transportation activity. Passenger kilometers travelled in non-OECD countries may double or triple between 2013 and 2050 (IEA 2016a). Increased access to safe, reliable transport is also enshrined in the targets of the Sustainable Development Goals. Such growth in activity implies a significant risk of lock-in to investments that may not be compatible with Paris Agreement objectives, especially for infrastructure.

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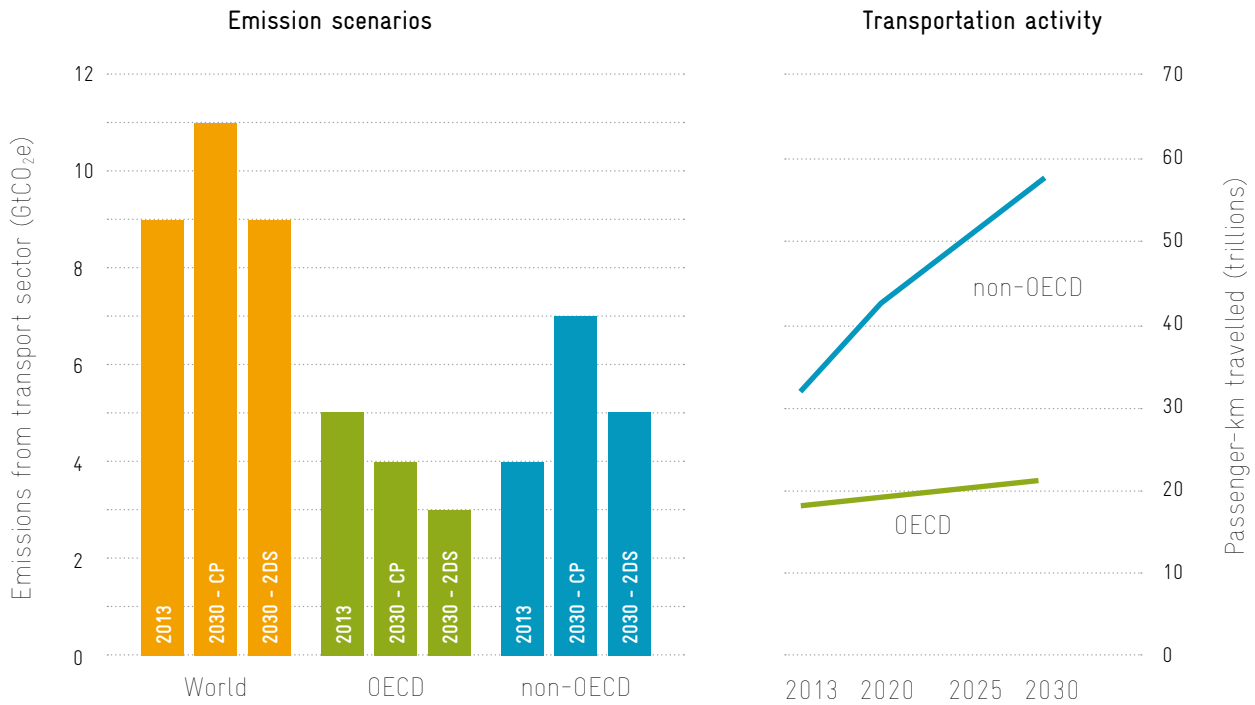


FIGURE 1: Transportation scenarios for OECD and non-OECD countries (CP: current policies; 2°C scenario (DS): pathway compatible with limiting warming to below 2°C). Authors' own elaboration, based on data from World Energy Outlook 2016 (IEA 2016c) and Energy Technology Perspectives 2016 (IEA 2016a).

Collectively, global emissions from transport are set to increase under current policies¹ by nearly 30% between 2013 and 2030, a common accounting year for targets of NDCs (IEA 2016c). In contrast, achievement of the long-term target of the Paris Agreement – to hold temperature increase to “well below 2°C” – requires significant deviations from this trend, as presented in Table 1.

Transport is one of the sectors with the greatest discrepancy between current policy pathways, and required pathways for 2°C or 1.5°C compatibility. It will, therefore, be important moving forward to prioritise the sector in NDCs and national climate strategies.



Rapid Bus Transport Systems like Bogotá's are an increasingly widespread way to make public transportation more appealing.

¹ Current policy pathways consider the likely trajectories under existing policies and major targets, and that these policies and targets are built upon. These trajectories are determined by independent third parties and may deviate from nationally determined baseline scenarios, the definitions of which are variable across countries.

TABLE 1: Selected implications of the Paris Agreement targets for the transport sector

INDICATOR / SUBSECTOR	SELECTED IMPLICATIONS OF PARIS AGREEMENT FOR REQUIRED PATHWAYS
Emissions (whole sector)	<p>2°C: By 2030, transport emissions should peak and drop below current levels, despite increases in transportation activity (IEA 2016c).</p> <p>2°C: Full decarbonisation of the entire energy sector (incl. transport) by 2060 to 2075 (UNEP 2016).</p> <p>1.5°C: Full decarbonisation of the entire energy sector (incl. transport) by 2045 to 2055 (UNEP 2016).</p>
Emissions intensity (whole sector)	<p>2°C: Between 2013 and 2030, emissions intensity of transport should reduce by at least 38% in OECD countries, and at least 22% in non-OECD countries (IEA 2016a).</p>
Road transport	<p>2°C: Emissions intensity of light road transportation should decrease by roughly 70% between 2015 and 2050 (Climate Action Tracker 2016).</p> <p>1.5°C: Full decarbonisation of light road transportation by 2050 (Climate Action Tracker 2016).</p> <p><i>These pathways are likely to mean the full electrification of the sector from renewable energy sources.</i></p> <p>1.5°C: By 2035, 100% of vehicles sold should be zero-emission vehicles (Climate Action Tracker 2016).</p>
Aviation and shipping	<p>2°C: Emissions intensity of aviation should decrease by 23% by 2025, and by over 80% by 2050, compared to 2013 (IEA 2016a).</p> <p>2°C: Low carbon fuels should supply at least 55% of aviation by 2050 (IEA 2016a).</p> <p>2°C / 1.5°C: The aviation sector will also have to reduce its emissions, aiming to eventually achieve zero emissions. If the direct emissions of aviation cannot be reduced to zero, then equivalent GHGs would have to be actively removed from the atmosphere through negative emission technologies once they are viable, rather than through offsets from emission reduction projects (Climate Action Tracker 2016).</p>

Approaches and opportunities for mitigation in the transport sector

Sustainable pathways for transport may be based on solutions that draw from the *avoid – shift – improve* logic (GIZ 2004). This logic emphasizes approaches that:

- avoid* unnecessary transportation activity by making journeys and urban spaces more efficient;
- shift* journeys to more sustainable modes such as public and non-motorised transport; and,
- improve* technologies and infrastructure for all modes of transport, including through fuel efficiency, the increased uptake of electrification and sustainable fuels.

National strategies for *improving* technologies are becoming more common. Vehicle fuel economy and emission standards are increasing in stringency in countries worldwide, with significant potential for the continued uptake of best practice policies in this regard (Healy et al. 2016). However, such policies have been severely undermined in

several countries through the recently uncovered emissions testing scandals. Several European countries are considering regulatory instruments for the phase out of conventional motor vehicles in the near future, favouring the uptake of electric vehicles (IEA 2016b). China has also recently proposed a new regulation requiring car sales in 2018 to include a minimum quota of 8% electric vehicles (Wall Street Journal 2016). Mitigation options for technological improvements in the transport sector are generally well researched, and becoming more affordable, although strategies and targets for the introduction of improved technologies are less common in developing countries.

New technology options can support continual improvements in emission intensities and potentially reduce emissions to net-zero through renewable energy based electrification. However, strategies that integrate such improvements with the concepts of *avoid* and *shift* are key to the achievement of broader emission reductions in the short- or medium-term, given the steep increases in

activity levels forecast in the transport sector worldwide. The uptake of such measures to complement existing intensity improvement measures is important in case these *improve* efforts do not yield their full long-term potential, and because the broader societal and economic benefits of avoid and shift measures are compelling. Such strategies remain largely undeveloped and uncoordinated in developed and developing countries alike, although promising examples of transformational transport planning are emerging on the subnational level in some cities (Copenhagen and Bogotá, for example, have seen significant developments in integrated urban transport planning, see United Nations 2012). In many cases, where avoid and shift strategies have been successfully implemented, these were not designed primarily for climate-related objectives but rather because they make sense for efficiency and safety of urban mobility. This is especially true for densely populated cities, such as Paris where the share of private cars in the modal split was reduced from 47% in 2002 to 17% in 2008 due to measures to address congestion and its associated issues (EPOMM 2016).

International aviation and international shipping are not explicitly addressed in the Paris Agreement or countries' NDCs. However, experts have called for a cap in emissions from international shipping and aviation as soon as possible if the ambitious goals of the Paris Agreement are to be reached (Guardian, 2016, Transport & Environment, 2016). Recent voluntary agreements for offsetting (e.g. ICAO's Carbon Offsetting and Reduction Scheme for International Aviation, CORSIA) show signs of increased recognition from organizations such as the International Civil Aviation Organisation (ICAO) and the International Maritime Organization (IMO), but it remains unclear whether the new agreements will have a significant impact. Target-setting and periodic review of targets is still lacking. Further attention is, therefore, required to integrate these emission sources with international and national climate policy, and to assign responsibilities for implementation of action and enhanced ambition.

Implementation of action for climate change mitigation in the transport sector can be impeded by a number of barriers. The inherent complexity of the sector and its interrelatedness with other sectors creates challenges for the development of widely suitable technical options and financing models that can leverage private sector capital.

Public transportation like this light rail in Addis Ababa has the potential to ease traffic in mega-cities and mitigate GHGs at the same time.

At the same time transport infrastructure is costly and burdens public finances. In particular, sustainable infrastructure and transformational redesign of transport modes requires investments that do not pay back within the short-term. They may also be subject to issues related to public acceptance, current mainstream cultural values and preferences, as well as psychological barriers related to perceived risk of change.

Transport sector in NDCs

Figure 2 shows that, although the transport sector is explicitly referred to for mitigation in the majority of NDCs (75%), few (21%) include specific targets for the sector, either directly or through decarbonisation indicators.

In most developed countries, the transport sector is included explicitly within an economy-wide emissions target. Generally, these countries prioritised *improve* measures; nearly half of all mitigation measures in high-income countries are directly related to fuel efficiency, decarbonising fuel and electric vehicles (SLoCaT & GIZ, 2016). Amongst developed countries, only Japan included a specific direct emissions reduction target for the transport sector in their NDC. Two other developed countries – Canada and South Korea – included decarbonisation based targets. There is considerable variation in how transport is covered in the NDCs of developing countries. The sector is often addressed through proposed policies and measures. While *improve*-oriented measures account for more than half of the measures from developing countries, *avoid* and *shift* measures – particularly public transport measures – are more commonly mentioned than they are in the NDCs of developed countries. Despite limited capacities for the



Coverage of the transport sector in NDCs

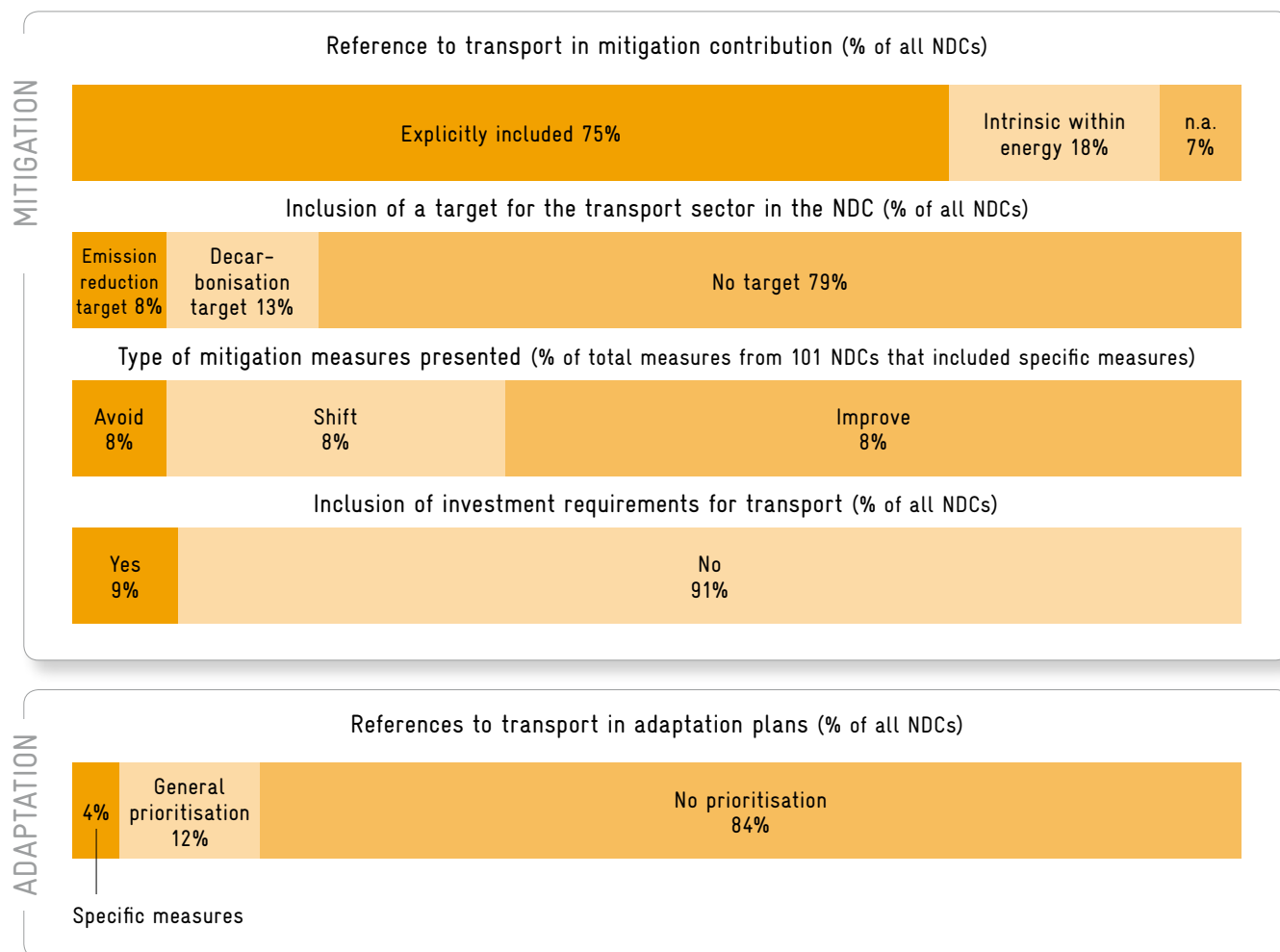


FIGURE 2: Overview of transport sector coverage in NDCs. Authors' own elaboration, based on PPMC & SLoCaT (2016).

preparation of NDCs, target-setting for the transport sector was more common in the NDCs of developing countries; 12 developing countries set direct emission reduction targets, with an additional 18 countries presenting targets based on decarbonisation indicators. Notably, of the 20 developed and developing countries that communicated indirect sector specific targets, each country used a different decarbonization indicator (PPMC & SLoCaT 2016).

Although more than two-thirds of countries include adaptation in their NDCs, few NDCs refer to adaptation plans for transport specifically. Even in the case that such plans are presented, the level of detail is very limited. Nevertheless, transport – particularly transportation infrastructure – is a particularly important sector

for adaptation and resilience to climate change impacts. Modern and efficient transportation infrastructure is vital to enhancing adaptive capacity directly but also indirectly by supporting economic development, economic diversification and resource access (Revi et al. 2014).

Moving ahead with implementation and raising ambition

Actions can be taken within the transport sector in the immediate- to short-term to support the implementation of the NDC targets and actions, and for raising ambition. Specific considerations for the transport sector are presented in the following.

Key steps for moving towards sector-driven implementation and ambition raising

Many of the key steps for moving ahead with NDC implementation and ambition raising are relevant for all sectors. They are summarised in this box. Further details on the individual steps can be found in the overview briefing paper of this briefing series.

Establishment of institutional bodies for oversight of implementation and monitoring of progress: Alignment of institutions based on optimisation of existing mandates, to include broader levels of governance in strategy making including finance and planning ministries, and devolvement of responsibilities to line ministries and agencies with most sector influence. Approaches developed should be resilient to government staff turnover.

Development and dissemination of knowledge on climate requirements and benefits: Enhancing understanding on the implications of the Paris Agreement for the sector, and the social and economic benefits of climate change mitigation and adaptation measures.

Plans for achievement of sector targets, and review of potential for increasing ambition in specific sub-sectors: Stock-take and integration of sub-national, national and non-state action, translation to subsector targets, determination of long-term full decarbonisation targets for the sector, and collation of this information into a target-based roadmap. Potential for ambition raising can be analysed based on regional best practice policies and consideration of targets for sub-sectors not covered in climate strategy.

Planning and implementation of instruments to leverage investments: Evaluation of investment requirements and the role of private and public finance for leveraging those investments. Analysis of persisting barriers and development of concepts for projects/programmes that can address those barriers through unilateral action or international support (e.g. NAMAs).

Revision of NDC: Update content of NDC for greater transparency, clarity and in line with aligned national strategy and identified ambition raising potential.

Introduction of policy packages and programmes to kick-start action: Introduction of new policies and strengthening of existing policies, in accordance with sector planning process, and development and submission of proposals for internationally supported programmes (e.g. NAMAs).

- » ***A key point for NDC revision, enabling environment for implementation and for raising ambition, is the alignment of strategies.*** The degree of misalignment between climate policy documents, and the mitigation potential of national and sub-national transport strategies is greater than for most other sectors. A large proportion of planned measures are not well reflected in many countries' NDCs. Better reflection of these plans could improve communicated ambition and could also help to attract international support for such measures. Countries should integrate transport planning authorities at the national and subnational level with the climate process and prioritise the revision of their NDCs.
- » ***Understanding and communication of the broader impacts and benefits of integrating avoid, shift and improve measures should be afforded greater attention.*** At least 9 targets of the Sustainable Development Goals are directly linked to sustainable transport (United Nations 2015). As most of these co-benefits are of relevance to the sub-national level, a benefits-related dialogue could better link the gap between subnational transport and national climate

policy. Enhanced research and communication of locally specific benefits could assist this dialogue and break down some political and cultural barriers for implementation of avoid and shift measures. These avoid and shift measures are essential to effect the transition that is required for reaching decarbonisation pathways that are compatible with the targets of the Paris Agreement.

- » ***Integration of overlapping sectors in urban planning can present opportunities for cost-sharing for transport.*** Within urban environments, significant overlaps exist between plans for transport, energy and the built environment. This is especially the case for future planning with sustainable pathways: trends for increasing electrification of urban transport will entail infrastructure requirements that overlap with needs for urban energy supply, including building-integrated renewables. Generally, integrated urban planning is very important in its own right for energy consumption and emissions in cities, but the issue spans various sectors and, therefore, is rarely given due attention in climate policy. Two multi-donor initiatives support these objectives, funded by the

German government (BMZ and BMUB): Mobilise Your City (<http://mobiliseyourcity.net/>) and the Transformative Urban Mobility Initiative (transformative-mobility.org).

- » ***Policies for immediate implementation are available from replication of regional best practices.*** Many developed and developing countries have introduced stringent policies for vehicle fuel efficiency and emissions, while an increasing number are introducing regulations that mandate greater deployment of electric vehicles. For more integrated avoid, shift and improve measures, planners can learn from successful programmes and infrastructure investments in developed and developing countries, for example, for cycling- and walking- oriented programmes or transit-oriented development planning. Such programmes may be suitable for attracting international finance. Transport infrastructure occupies a large part of investment portfolios of most development finance institutions. Low-emissions transport is also identified as one of eight key impact areas of the GCF. The development of vertically integrated NAMAs (V-NAMAs) that include actions at various levels of governance and public-private partnership (PPP) models are also increasing in popularity for sustainable transport.
- » ***The compilation of NDCs by countries ahead of COP21 was a remarkable achievement, but the short timeframe available for the preparation of NDCs has left some gaps for the transport sector, which could be improved in NDC revisions.*** NDC revisions would provide more clarity and transparency if they included targets for various transport sub-sectors, long-term decarbonisation goals, and decarbonisation indicators. In order to consider the inclusion of such information countries would benefit from greater guidance on standardised approaches to the communication of transport sector decarbonisation indicators. In this regard, not only emissions are of interest, but also activity in the transport sector and efficiencies of various modes. The inclusion of greater detail in the NDC document itself, based on standardised approaches, can have a significant impact on the development of enabling conditions for implementation: such details provide a clear direction for the development of sector action plans, offer clear long-term signals to private sector industries, and offers easier identification of ambition-raising potential and support needs.

- » ***Enhanced availability of data on the transport sector can assist planning processes and increase ambition.*** It is notable that few countries include quantitative information or targets for the transport sector in their NDCs although the sector is explicitly mentioned in most contributions. Better access to reliable information may lead to the identification of further emission-reduction potential, and greater confidence for planning and target-setting. Improving the availability of reliable data is essential in order to fill gaps for clarity and transparency in future NDC revisions.

FURTHER READING

Further details on the topics discussed in this briefing paper may be found in the following sources, amongst others:

Emission scenarios for the transport sector

- IEA, 2016 → [World Energy Outlook 2016](#) (current policy and 450ppm scenarios for energy use and energy emissions from transport up to 2040).
- IEA, 2016 → [Energy Technology Perspectives](#) 6°C, 4°C and 2°C scenarios (6DS, 4DS, and 2DS) for energy use, energy emissions and activity indicators from transport sub-sectors up to 2050).

Long term implications of 2°C and 1.5°C for the sector

- UNEP 2016, → [Emissions Gap Report 2016](#) (indication of timeline for full decarbonisation from energy and non-energy sectors).
- Climate Action Tracker, 2016 → [10 most important steps to limit warming to 1.5°C](#) (requirements and feasibility of options for 1.5°C compatibility in light road transportation and aviation).
- International Transport Forum, 2017 → [ITF Transport Outlook 2017](#) (overview of recent trends and near-term prospects for the transport sector at a global level, prospects for transport demand to 2050, for freight (maritime, air and surface), passenger transport (car, rail and air) and CO₂ emissions).

Integration of transport sector in NDCs

- GIZ, SLoCaT and Ricardo Energy & Environment, 2016 → [Proposed Avenues for NDCs – Increasing the Potential of Nationally Determined Contributions \(NDCs\) for Ambitious Action on Transport and Climate Change](#) (first propositions on how to increase the involvement and ambition of the transport sector based on early results of ongoing case study research on the role of the transport sector in INDC development and future NDC implementation).
- SLoCaT & PPMC, 2016 → [Increasing the Potential of Nationally Determined Contributions \(NDCs\) for Ambitious Action on Transport and Climate Change](#) (overview of the coverage of the transport sector in NDCs including measures, targets and finance).
- World Bank, 2016 → [NDC Platform](#) (searchable database of sector and sub-sector specific details in all NDCs).

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About the GIZ Climate Policy Support Programme

GIZ Climate Policy Support Programme aims at developing and mainstreaming innovative approaches to tackle the challenges of climate change in the context of German Development Cooperation. On behalf of the Federal Ministry for Economic Cooperation and Development (BMZ), it supports developing countries in their efforts to mitigate climate change and to adapt efficiently to its impacts. Through conceptual and practical activities, the Climate Policy Support Programme actively contributes to the implementation of the Paris Agreement and the UN Sustainable Development Goals.

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